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Controlling Valence of DNA-Coated Emulsion Droplets with Multiple Flavors of DNA ANGUS MCMULLEN, DYLAN BARGTEIL, DAVID PINE, JASNA BRUJIC, New York University — We explore the control of valence of DNA-coated emulsion droplets as a first step in developing DNA-directed self-assembly of emulsions. Emulsion droplets differ from solid colloids in that they are deformable and the DNA strands attached to them are free to move along the emulsion surface. The balance of binding energy and droplet deformation provides control over a droplet's valence via its ligand density. After binding, some DNA often remains unbound due to the entropic cost of DNA recruitment. In practice, therefore, the assembly kinetics yield a distribution in valence. Our goal is to control valence by altering the binding kinetics with multiple flavors of DNA. We coat one set of droplets with two DNA types, A and B, and two other sets with one complementary strand, A' or B'. When an AB droplet binds to an A' droplet, the adhesion patch depletes A strands, leaving the rest of the droplet coated with more B than A strands. This increases the chance that the next droplet to bind will be a B' rather than an A'. Controlling valence will allow us to build a wide array of soft structures, such as emulsion polymers or networks with a determined coordination number. This work was supported by the NSF MRSEC Program (DMR-0820341).

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